

MANAGEMENT RECOMMENDATIONS FOR WASHINGTON'S PRIORITY SPECIES: VOLUME V

MAMMALS

Merriam's shrew *Sorex merriami*

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GENERAL RANGE AND WASHINGTON DISTRIBUTION

The Merriam's shrew is found east of the Cascades and Sierra Nevadas, south to southern Arizona and New Mexico, and east to the western Great Plains (Verts and Carraway 1998, Wilson and Ruff 1999). Researchers recently discovered this species outside the United States in the southern Okanagan region of British Columbia (Nagorsen et al. 2001). Because of inadequate and biased sampling, the actual distribution of Merriam's shrews is likely more extensive than documented (Nagorsen et al. 2001). Nowhere do Merriam's shrews appear to be abundant (Verts and Carraway 1998).

In the Pacific Northwest, Merriam's shrews are found primarily in the arid portions of the region (Verts and Carraway 1998). Their Washington range includes portions of central and southeastern Washington (Hudson and Bacon 1956, Johnson and Cassidy 1997; Figure 1).



Figure 1. Potential range of the Merriam's shrew (*Sorex merriami*) in Washington based on Johnson and Cassidy's (1997) habitat modeling analysis. Since Johnson and Cassidy's (1997) model is based on a small number of captured shrews, individual Merriam's shrews likely exists beyond areas shaded on this map.

RATIONALE

The Merriam's shrew, classified as a Candidate for listing as Threatened or Endangered in Washington, is primarily associated with arid shrub-steppe and steppe communities (James 1953, Hudson and Bacon 1956, Larrison 1976, MacCracken et al. 1985, Ports and McAdoo 1986). Because agricultural land uses have had a profound effect on steppe communities in the Columbia Basin (Vander Haegen et al. 2001), it is likely that populations of Merriam's shrews have been impacted by related habitat loss, fragmentation, and degradation in eastern Washington. Few studies of small mammals (shrews and rodents) have been conducted in the shrub-steppe habitats of eastern Washington except for studies at the Hanford Reservation, the Arid Lands Ecology Reserve, and the Yakima Training Center (Vander Haegen et al. 2004). Therefore, additional survey information needs to be

collected to have a better understanding of the actual abundance and status of Merriam's shrews in Washington (Vander Haegen et al. 2004).

HABITAT REQUIREMENTS

A limited number of studies have examined the habitat requirements of Merriam's shrews, and most published literature has been based on the capture of a small number of individuals. The most commonly reported habitat of this species is sagebrush-steppe, but it also has been found in semi-arid grasslands, pinyon-juniper (*Pinus-Juniperus*) woodlands, high elevation brushlands, and even mixed woodlands of ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and cottonwood (*Populus balsamifera*) (Wilson and Ruff 1999). Based on captured specimens, this species is commonly reported to be associated with sagebrush (*Artemisia* spp.)-bunchgrass habitats in eastern Washington (James 1953, Hudson and Bacon 1956, Johnson and Clanton 1954). Big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus* sp.), and bitterbrush (*Purshia tridentata*) are commonly found in areas where Merriam's shrews are present (MacCracken et al. 1985, Ports and McAdoo 1986, Kirkland et al. 1997, Nagorsen et al. 2001). In eastern Nevada, Merriam's shrew habitat included areas of moderate shrub cover, sparse forb and bunchgrass understory and extensive bare ground as well as south-facing slopes of dense big sagebrush, bitterbrush, squaw current (*Ribes cereum*), and mountain snowberry (*Symphoricarpus oreophilus*) (Ports and McAdoo 1986).

Although this species appears to be primarily associated with dry habitats, they have been observed in wetland communities on very rare instances (McDaniel 1967, Williams 1984). Merriam's shrews are estimated to occur at elevations ranging between 365 and 915 m (1200-3000 ft) in the Columbia Basin and 185 and 975 m (600-3200 ft) in the Blue Mountains (Johnson and Cassidy 1997).

Merriam's shrews feed on an assortment of invertebrates. Stomach and intestines of Merriam's shrews trapped in eastern Washington contained spiders, beetles, caterpillars, cave crickets, and ichneumon (wasp-like) flies (Johnson and Clanton 1954). The winter and summer diets of shrews are generally similar, consisting of active, ground dwelling invertebrates (Aitchison 1987). Aitchison (1987) suggested that during the winter shrews hunt insects beneath the snow layer by means of sound and vibrissae (touch receptors).

Merriam's shrews are believed to be associated with other small, burrowing mammals (Johnson and Clanton 1954, Brown 1967). Specifically, Merriam's shrews were found using runways of voles (*Microtus*) along fencerows in Montana (Armstrong and Jones 1971). They have been trapped coming out of the burrow of a sagebrush vole (*Lemmyscus curtatus*) (James 1953, Johnson and Clanton 1954). Johnson and Clanton (1954) suggested that the underground passages furnished protection for the shrews and the insects on which they subsisted. Ports and McAdoo (1986) trapped Merriam's shrews at two locations where two other shrew species, voles, pocket gophers, mice, and chipmunks also were caught. However, they also trapped Merriam's shrews at two locations where no other small mammals were caught, indicating that an association with other small, burrowing mammals might not be requisite.

LIMITING FACTORS

Merriam's shrews are closely associated with shrub-steppe communities (Wunder and Carey 1994) that formerly extended over nearly all non-forested lands in Washington east of the Cascade crest (Daubenmire 1970). Currently, over half of Washington's native shrub-steppe has been converted to agriculture, resulting in a fragmented landscape with few extensive tracts (Vander Haegen et al. 2000). With the widespread decline and fragmentation of shrub-steppe, concern has focused on those species that might be most affected by these impacts (Jacobson and Snyder 2000, Vander Haegen et al. 2000), including Merriam's shrews (Wunder and Carey 1994).

MANAGEMENT RECOMMENDATIONS

The information available on the distribution and ecological needs of the Merriam's shrew is not adequate enough to provide species-specific recommendations. Therefore, the following are generalized guidelines based on the major factors influencing species that depend on the availability of steppe communities.

This species is associated with arid shrub- and grass-dominated habitats. Consequently, these important areas should be conserved. Because Merriam's shrews are found most often in sage-grass and undisturbed bunchgrass habitats (Larrison 1976), these habitats should not be degraded through activities such as conversion to croplands, chaining, spraying of chemicals, burning, or overgrazing (i.e., repeated grazing that exceeds the recovery capacity of the vegetation and creates or perpetuates a deteriorated plant community).

Habitat fragmentation most greatly impacts rodents, such as the Merriam's shrew, that have low mobility (Vander Haegen et al. 2001). Therefore, when identifying areas in need of protection for this species, one should attempt to not only protect patches of known habitat, but adjacent habitat corridors (e.g., riparian areas) that potentially allow individuals within a population to disperse and not become isolated and vulnerable.

Merriam's shrews are insectivorous, and the use of insecticides may negatively impact this species. If insecticide or other chemical use is planned for areas where this species occurs, review Appendix A for contacts to assist in assessing the use of chemicals and other alternatives.

Our knowledge of shrews is principally based on work in forested habitats, and comparatively little is known about shrews associated with arid regions (Kirkland et al. 1997). Until more local research and surveys are conducted, the possibility for specific management geared towards the conservation of Merriam's shrews is limited. Research and monitoring are needed to more fully understand the distribution and ecological needs of Merriam's shrews. Researchers also should focus on understanding factors that influence the success of this species and of other small mammals that use steppe and other arid communities.

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KEY POINTS

Habitat Requirements

- Primarily inhabit sagebrush-steppe, but also has been found in semi-arid grasslands, pinyon-juniper woodlands, high elevation brushlands, and even mixed woodlands of ponderosa pine, Douglas-fir, and cottonwood.
- Big sagebrush, rabbitbrush, and bitterbrush as well as bunchgrasses are commonly found in areas where Merriam's shrews are present.
- Feed on an assortment of invertebrates consisting of active, ground dwelling invertebrates that include spiders, beetles, caterpillars, cave crickets, and ichneumon (wasp-like) flies.
- Believed to be associated with other small, burrowing mammals because they have been found using runways of voles along fencerows as well as other small mammalian species.

Management Recommendations

- Additional research, surveys, and monitoring are needed to develop species-specific management recommendations for Merriam's shrews.
- Sage-grass and undisturbed bunchgrass habitats should not be degraded through activities such as conversion to croplands, chaining, spraying of chemicals, burning, or overgrazing (i.e., repeated grazing that exceeds the recovery capacity of the vegetation and creates or perpetuates a deteriorated plant community).
- Attempt should be made to not only protect patches of known habitat, but adjacent habitat corridors (i.e., riparian areas) that potentially allow individuals within a population to disperse.
- Review Appendix A for contacts to assist in assessing the use of chemicals and other alternatives if insecticide or other chemical use is planned for areas where this species occurs.